PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 October 2000 (20.10.00)	
International application No. PCT/FI00/00221	**Applicant's or agent's file reference** 2990020PC/ko
International filing date (day/month/year) 17 March 2000 (17.03.00)	**Priority date** (day/month/year) 18 March 1999 (18.03.99)
Applicant HARLIN, Ali et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

25 September 2000 (25.09.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Manu Berrod
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

FI0000221

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Ali HARLIN, Matti HIRVENSALO Attn: PCT Branch

Application No. U. S. National Stage of PCT/FI00/00221

Filed: August 28, 2001 Docket No.: 110486

For: PROCESS FOR PRODUCING A CROSS-LINKED POLYMER PRODUCT

SUBMISSION OF THE ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Director of the U.S. Patent and Trademark Office
Washington, D.C. 20231

Sir:

Attached hereto is a submission of the annexes to the International Preliminary Examination Report (Form PCT/IPEA/409). The attached translated material replaces page 6 of the specification.

Respectfully submitted,

James A. Oliff
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JAO:JSA/cln

Date: August 28, 2001

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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
2990020Pc/ko		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI00/00221	17.03.2000	18.03.1999
International Patent Classification (IPC) or national classification and IPC7		
C08F 255/00, B29C 47/92		
Applicant		
Nextrom Holding S.A et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

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Date of submission of the demand	Date of completion of this report
25.09.2000	27.06.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Helena Danielsson/BS Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/FI00/00221

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:
pages 1-5 , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the claims:
pages _____ , as originally filed
pages _____ , as amended (together with any statement) under article 19
pages _____ , filed with the demand
pages 6 , filed with the letter of 12.04.2001

☐ the drawings:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:
pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-12	YES
	Claims		NO
Inventive step (IS)	Claims	1-12	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-12	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention relates to a process for producing a polymer product cross-linked by silane. The polymer is produced by feeding a polymer, a silane, an initiator and a cross-linking catalyst into an extruder resulting in a grafted material, which is thereafter cross-linked by using water.

The invention intends to solve the problem associated with unsatisfactory cross-linking degree in the produced polymer by determining the grafting degree of the grafted material on-line and continuously adjusting the amounts fed to the extruder based upon the obtained result.

Amended claims 1-12 were filed with the letter of 12.04.2001. The subject matter of the claims is restricted to a process where the concentrations of the components affecting the grafting degree are determined in the flow line after grafting.

The most relevant document cited in the International Search Report was:

D1 GB 2202537 A

Document D1 makes known a method for the control of a continuous-flow process where side-chains are grafted to a polymer. The process comprises continuous measuring of at least one rheological property of the polymer at a place where at least a substantial part of the grafting has taken place. The reagent concentration is adjusted in order to maintain the measured property within pre-set limits.

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V

The difference between the claimed invention and D1 is that in the claimed invention the control is based on separate measurements of the contents of said components in the grafted material, whereby the dosage of the components can be controlled. D1 discloses the measuring of rheological properties, e.g. viscosity, instead of measuring the grafting degree itself. The measuring of the rheological properties does not separately show the concentrations of silane and peroxide, and on basis of e.g. a viscosity measurement it is not possible to solve the problems relating to wrong concentrations of silane and peroxide.

In view of the above, it is considered that the invention claimed in claims 1-12 fulfils the requirements of novelty, technical applicability and inventive step.

CLAIMS (amended on April 12, 2001)

1. A process for producing a polymer product cross-linked by silane where a polymer, a grafting agent, an initiator and a cross-linking catalyst and possible additives are fed into an extruder and extruded, whereafter the grafted material obtained is cross-linked using water and the catalyst for obtaining a cross-linked polymer product, in which process the grafting degree of the grafted material is controlled by an on line method, **characterized** by determining in the flow line after grafting the concentrations of the components affecting the grafting degree and based upon the results obtained, continuously adjusting the amounts of the components to be fed into the extruder in order to obtain the desired grafting degree.

2. A process as claimed in claim 1, **characterized** by determining the concentrations by using IR spectrometry.

3. A process as claimed in claim 1 or 2, **characterized** by also determining the cross-linking degree of the cross-linked polymer product.

4. A process as claimed in any one of claims 1 to 3, **characterized** by determining the cross-linking degree using a thermomechanical analyzer.

5. A process as claimed in any one of claims 1 to 4, **characterized** by using a polymer, which is a polyethylene.

6. A process as claimed in any one of claims 1 to 4, **characterized** by using a grafting agent, which is a silane compound.

7. A process as claimed in claim 6, **characterized** by using a silane compound, which is a vinyl trimethoxy silane.

8. A process as claimed in any one of claims 1 to 7, **characterized** by using an initiator, which is a peroxide.

9. A process as claimed in claim 8, **characterized** by using dicumyl peroxide as an initiator.

10. A process as claimed in any one of claims 1 to 8, **characterized** by using dibutyltin dilaurate as a cross-linking catalyst.

11. A process as claimed in any one of claims 1 to 10, **where** the grafted product is a cable or conductor insulation.

12. A process as claimed in any one of claims 1 to 11, **where** the grafted product is a pipe.

CLAIMS

1. A process for producing a polymer product cross-linked by silane where a polymer, a grafting agent, an initiator and a cross-linking catalyst and possible additives are fed into an extruder and extruded, whereafter the grafted material obtained is cross-linked using water and the catalyst for obtaining a cross-linked polymer product, **characterized** by determining the degree of the grafted material using an on line method, and based upon the result obtained, continuously adjusting the amounts of the components to be fed into the extruder in order to obtain the desired grafting degree.

2. A process as claimed in claim 1, **characterized** by determining the grafting degree using IR spectrometry.

3. A process as claimed in claim 1 or 2, **characterized** by also determining the cross-linking degree of the cross-linked polymer product.

4. A process as claimed in any one of claims 1 to 3, **characterized** by determining the cross-linking degree using a thermomechanical analyzer.

5. A process as claimed in any one of claims 1 to 4, **characterized** by using a polymer, which is a polyethylene.

6. A process as claimed in any one of claims 1 to 4, **characterized** by using a grafting agent, which is a silane compound.

7. A process as claimed in claim 6, **characterized** by using a silane compound, which is a vinyl trimethoxy silane.

8. A process as claimed in any one of claims 1 to 7, **characterized** by using an initiator, which is a peroxide.

9. A process as claimed in claim 8, **characterized** by using dicumyl peroxide as an initiator.

10. A process as claimed in any one of claims 1 to 8, **characterized** by using dibutyltin dilaurate as a cross-linking catalyst.

11. A process as claimed in any one of claims 1 to 10, **where** the grafted product is a cable or conductor insulation.

12. A process as claimed in any one of claims 1 to 11, **where** the grafted product is a pipe.